

## Claims

1.           A tilt indicator for use on a firearm, in conjunction with a scope having optical elements therein comprising:
  - a)       an eyepiece configured to be coupled to the firearm behind all of the optics of the scope and through which the user views the target with a targeting display superposed on the target with the target being viewed via the user's primary concentration; and
  - b)       a firearm level indicating system carried by said eyepiece and having a firearm level indicator signal configured to be located behind all of the optical elements of the scope so as to be viewed by the user's secondary concentration while the viewer's primary concentration is on the target so the viewer's primary concentration on the target via the targeting display is uninterrupted and non-distracted by said firearm level indicating system.
2.           The tilt indicator defined in claim 1, wherein said firearm level indicator signal is located to be viewed by the user via the user's peripheral vision when the viewer's central vision is focused on the target via the targeting display in said scope.
3.           The tilt indicator defined in claim 1, wherein said level indicating system includes a fiber optic system.

4. The tilt indicator defined in claim 1, wherein said level indicating system includes an LED.
5. The tilt indicator defined in claim 1, wherein said level indicating system includes an incandescent light source.
6. The tilt indicator defined in claim 1, wherein said level indicating system is mounted on a barrel of the firearm.
7. The tilt indicator defined in claim 1, wherein said level indicating system includes a yellow display and a green display.
8. The tilt indicator defined in claim 1, wherein said level indicating system includes an optical level sensor.
9. The tilt indicator defined in claim 1, wherein said level indicating system includes a circuit using resistance of an element to control the level indicator signal.
10. The tilt indicator defined in claim 1, wherein the targeting display includes an outer perimeter and said level indicator signal is located outside of said outer perimeter.

11.           The tilt indicator defined in claim 1, wherein said level indicator signal is spaced from an area associated with the viewer's primary concentration.

12.           The tilt indicator defined in claim 1, wherein said level indicating system includes a circuit with an inductive component to control the level indicator signal.

13.           The tilt indicator defined in claim 1, wherein said level indicating system includes a tube mounted on the firearm and an opaque element located inside said tube.

14.           The tilt indicator defined in claim 1, wherein said level indicating system further includes a tube mounted on the firearm for movement therewith, an electrically conductive element movably mounted in said tube, an electrically conductive element having an inductive field  
5 associated therewith mounted on the tube to have said electrically conductive element intersect said field when the firearm is tilted and which has the inductance thereof change as said conductive element intersects said field, and a circuit which includes said inductive element and which changes electrical characteristics as the inductance of said inductive  
10 element changes.

15. The tilt indicator defined in claim 13 further including a viscous fluid in said tube.

16. The tilt indicator defined in claim 13, wherein said eyepiece includes a telescopic sight.

17. The tilt indicator defined in claim 1, wherein said eyepiece includes a peep sight.

18. The tilt indicator defined in claim 1, wherein said level indicator signal is located to be viewed outside the macula lutea of the user's eye.

19. The tilt indicator defined in claim 3, wherein said level indicating system includes a light generator, a light sensor and a mask interposed between said light generator and said light sensor, said mask including holes which transmit light therethrough when the firearm is in a  
5 selected orientation and opaque areas which prevent light from passing through the mask when the firearm is in other orientations.

20. The tilt indicator defined in claim 19, wherein said mask is pivotally mounted on the firearm to pivot as the firearm is moved between said selected orientation and the other orientations.

21.           The tilt indicator defined in claim 20, wherein said mask further includes dampers which control pivoting movement of said mask.

22. A tilt indicator for use on a firearm comprising:

- a) an eyepiece for a firearm through which a user views a target with a targeting display superposed on the target, said targeting display lying with a perimeter of a primary circle having a perimeter diameter equal to approximately  $M_L(X/E)$  where  $M_L$  is the diameter of the macula lutea;  $X$  is the distance between a plane containing the cornea of the viewer's eye and a plane containing the targeting display; and  $E$  is the distance between a plane containing the viewer's retina and the plane containing the cornea of the viewer's eye; and
- b) a firearm level indicating system on the firearm and having a firearm level indicating signal located in a secondary circle having a diameter greater than the diameter of said primary circle and less than a diameter equal to approximately  $O_v(X/E)$  where  $O_v$  is the diameter of a circle projected from the plane containing the viewer's retina at the maximum limit of sight without movement of the eye through the viewer's cornea at a distance  $X$  from the cornea whereby the level indicating signal is located outside the central vision primary circle but is viewed within the peripheral vision while the central vision is focused on the targeting display.

23. A tilt indicator for use on a firearm comprising:

a) an eyepiece on a firearm through which a user views a target and aligns a targeting display to aim the firearm;

b) a firearm level indicating system on the firearm and  
5 having a firearm level indicating signal located outside the user's central vision when that central vision is focused on said targeting display and consisting entirely of illumination elements which are activated when the firearm is level or non-level respectively.

24. A tilt indicator for use on a firearm comprising:
- a) an eyepiece on a firearm through which a user views a target and aligns a targeting display to aim the firearm;
  - b) a firearm level indicating system on the firearm and
- 5 having a firearm level indicating signal located outside the user's central vision when that central vision is focused on said targeting display and consisting entirely of non-analog signals.



25. A tilt indicator for use on a firearm comprising:

a) an eyepiece on a firearm through which a user views a target and aligns a targeting display to aim the firearm;

b) a firearm level indicating system on the firearm and  
5 having a firearm level indicating signal located outside the user's central vision when that central vision is focused on said targeting display and consisting entirely of level/non-level signals so that the signals from said level indicating signal are passively received by the user.

26. A method of leveling a firearm during use comprising:

a) focusing a user's central vision on a targeting display on a firearm;

b) indicating a non-level orientation of the firearm outside the user's central vision;

c) said step of indicating a non-level orientation of the firearm includes generating illumination; and

d) moving the firearm until a level orientation of the firearm is achieved while maintaining central vision focused on the targeting display.

27. The method of claim 26, wherein the step of indicating non-level orientation further comprises:

generating a first color of illumination for indicating a level orientation, and

generating a second, different color of illumination for indicating the non-level orientation.

28. A method of leveling a firearm during use comprising:

a) focusing a user's central vision on a targeting display on a firearm;

b) indicating a non-level orientation of the firearm outside the user's central vision;

c) said step of indicating a non-level orientation of the firearm consisting entirely of generating non-analog signals; and

d) moving the firearm until a level orientation of the firearm is achieved while maintaining central vision focused on the targeting display.

29. A tilt indicator for use on a firearm comprising:

a) an eyepiece on a firearm through which a user views a target and aligns a targeting display to aim the firearm;

b) a firearm level indicating system on the firearm and having a  
5 binary firearm level indicating signal located outside the user's central vision when that central vision is focused on the targeting display and including binary visual indicators which are activated when the firearm is level and which are deactivated when the firearm is non-level.

30. The tilt indicator defined in claim 29, wherein said level indicating system includes further binary visual indicators which are activated when the firearm is non-level and which are deactivated when the firearm is level.

31. Apparatus for indicating tilt of a firearm, comprising:

a) an ocular housing adapted to be mounted on the firearm and having a display through which an image is viewable, wherein said display includes at least one signal indicator, wherein said signal indicator is  
5 configured to permit visual acquisition of said image through said display without obstruction by said signal indicator;

b) tilt sensing circuitry adapted to be supported by the firearm and configured to generate a signal indicative of firearm tilt;

c) a controller responsive to said signal generated by said  
10 sensing circuitry and operable to illuminate said signal indicator according to the firearm tilt.

32. The apparatus of claim 31, wherein said signal indicator further comprises two differently colored lights for respectively indicating level and non-level orientations of the firearm.

33. The apparatus of claim 31, wherein said ocular housing is configured to removably attach to a firearm scope.

34. The apparatus of claim 31, wherein said signal indicator is a light emitting diode.

35. The apparatus of claim 31, wherein said tilt sensing circuitry generates said signal in response to sensing that said ocular housing is oriented at an angle relative to a zero reference point.

36. The apparatus of claim 31, wherein said controller initiates activation of a first signal indicator when said ocular housing is oriented within a first tilt range relative to said zero reference point, and a second signal indicator when said ocular housing is oriented within a second range  
5 relative to said zero reference point.

37. The apparatus of claim 36, wherein a size of said first tilt range for a first resolution mode is smaller than said size of said first tilt range while operating in a second resolution mode.

38. The apparatus of claim 31, wherein said tilt sensing circuitry includes an accelerometer.

39. The apparatus of claim 31, wherein said ocular housing includes an interface configured to set a parameter selected from a group consisting of: brightness, resolution mode, reference zero, and some combination thereof.

40. The apparatus of claim 31, wherein said controller initiates storage of a setting associated with a group consisting of: brightness, zero reference, resolution mode, and some combination thereof.

41. The apparatus of claim 31, wherein said signal indicator is positioned on an annular ring.

42. A method for indicating tilt within an ocular housing having a display through which an image is viewable, wherein said display includes at least one signal indicator for relating tilt positioned on the periphery of said display in such a manner as to permit visual acquisition of said image,

5 comprising:

a) generating a signal in response to sensing a tilt relative to a zero reference point;

b) activating at least one signal indicator in response to said signal, wherein said signal indicator is configured so as to permit visual  
10 acquisition of said image.

43. The method of claim 42, further comprising configuring said ocular housing to removably attach to a sighting device.

44. The method of claim 42, further comprising configuring said ocular housing to removably attach to a firearm scope.

45. The method of claim 42, further comprising generating said signal in response to sensing that said ocular housing is oriented at an angle relative to a zero reference point.



46. The method of claim 42, further comprising activating a first signal indicator when said ocular housing is oriented within a first tilt range relative to said zero reference point, and a second signal indicator when said ocular housing is oriented within a second range relative to said zero reference point.

47. The method of claim 42, further comprising configuring a parameter selected from a group consisting of: brightness, resolution mode, reference zero, and some combination thereof.

48. The method of claim 42, further comprising storing a setting associated with a group consisting of: brightness, zero reference, resolution mode, and some combination thereof.

49. The method of claim 42, further comprising:  
activating a first signal indicator of a first color when said ocular housing is oriented within a first tilt range relative to said zero reference point, and  
activating a second signal indicator of a second, different color when said ocular housing is oriented within a second range relative to said zero reference point.